

MEMORANDUM OF AGREEMENT

Between

CITY OF SPRINGFIELD, OHIO

And

OHIO NATIONAL GUARD – STATE AVIATION OFFICE

For

OPERATION OF SMALL UNMANNED AIRCRAFT SYSTEMS WITHIN

CLASS D AIRSPACE

PREAMBLE

WHEREAS, The Adjutant General's (TAG) Office of Ohio desires to conduct small Unmanned Aerial Systems (sUAS) training to support use of sUAS by the Ohio National Guard (ONG) and to promote the use and advancement of sUAS in Ohio.

WHEREAS the City of Springfield, Ohio is owner of the Springfield-Beckley Municipal Airport (KSGH) and is the location of the Springfield-Beckley Air National Guard Base.

WHEREAS KSGH has the requisite airspace and facilities to conduct sUAS training and is in close proximity to public and private universities and other entities for research and development (R&D) for sUAS technology and procedures.

WHEREAS the City of Springfield and TAG desire to partner together and utilize the Class D airspace at KSGH to conduct sUAS training, further R&D for sUAS, and to make KSGH one of the Centers of Excellence for sUAS within Ohio

Now therefore, TAG and the City of Springfield agree that this undertaking shall be implemented in accordance with the following guidance and responsibilities set forth in this Memorandum of Agreement (MOA)

ARTICLE 1.0 PURPOSE AND SCOPE

1.1. PURPOSE: MOA establishes the Standard Operating Procedures (SOP's) for the ONG to conduct sUAS training within the Class D Airspace at KSGH. Special coordination and approval from both the ONG State Aviation Office (SAO) and the Air Traffic Manager (ATM) at KSGH is required should any procedure require further amendment to this agreement.

1.2. SCOPE: KSGH's Class D airspace extends 4.5 NM from the geographical center of the airport. The specific sUAS flying area covered in this MOA is bounded by the limits of each specific FAA approved Certificate of Authorization. In general terms, this area is defined as extending from approximately the length of Runway 6/24 and out to the south approximately .5 mile. Altitude is

COA specific but will be within the Class D airspace. All operations will be entirely within the KSGH Class D airspace.

ARTICLE 2.0 RESPONSIBILITIES

2.1. INTRODUCTION: This Standard Operating Procedure (SOP) will be used in conjunction with an approved Airworthiness Release and Federal Aviation Administration (FAA) Certificate of Waiver or Authorization (COA) for operations at KSGH. The ATM will be provided a copy of the approved FAA COA and will assess for safety and operational impact prior to flight approval.

2.2. GENERAL: One Pilot in Command (PIC) must be designated at all times and is responsible for the safety of the Unmanned Aircraft (UA) and persons and property along the UA flight path. The PIC will be held accountable for controlling their aircraft to the same standards as the pilot of a manned aircraft. The provisions of 14 CFR 91.13, Careless and Reckless Operation, apply to sUAS pilots. Unmanned Aircraft Systems operations at KSGH will be conducted within the confines of the COA. Operations may be conducted a maximum of 5 times a week, and up to 5 one-hour flights per day. All sUAS operations will be conducted in Visual Meteorological Conditions (VMC) during the hours of sunrise to sunset and will maintain visual contact with the ground at all times. Visual Observers (VO) will remain in contact with the PIC and will be positioned so that they remain within 1 nautical mile horizontally and 3000 feet vertically of the UAS during all operations (or within visual limits if less than the aforementioned).

Additionally:

- Only one (1) sUAS may be operated at a time.
- Safety of manned aircraft will always take precedent over UA.
- The ATM (or qualified representative) will brief UAS Pilot/Operator detailing sUAS airspace, local pattern procedures, emergency, communication and lost link procedures.
- The sUAS operator will pre-coordinate all UAS missions with the ATM. A representative from the control tower shall attend all pre-flight briefings.
- All sUAS operators will sign the KSGH Safety Waiver Briefing from the ATM.
- Strict compliance with the governing COA is paramount.

2.3 REFERENCES & GUIDANCE

AR 95-2 *Airspace. Airfields/Helicopters, Flight Activities, Air Traffic Control and Navigational Aids*

AR 95-23 *Unmanned Aircraft Systems Flight Regulations*

FAA FAR's and other guidance pertaining to sUAS operations

** If there is any conflict between this SOP and other Operator guidance, the most restrictive guidance will be followed.

2.4 UAS PATTERN: UAS flight operations shall be contained within the COA defined UAS airspace zone located south from Runway 6/24.

- A maximum ceiling of 1500' AGL (2500' MSL) or as defined by the COA

- UA operations shall be launched and recovered from the approach end of Runway 33 or as coordinated within the airspace zone with ATC.
- UA flight operations are not authorized during manned aircraft operations.
- ATC shall provide visual separation during UA operations and maintain a listening and radar watch for all non-cooperative manned aircraft approaching to overfly the KSGH Class D Airspace.

2.5 FLIGHT SCHEDULING AND NOTAMS: sUAS operations within KSGH Class D airspace will be scheduled a minimum of 24 hours prior with the KSGH Air Traffic Manager who will then coordinate with Columbus Terminal Approach Radar Control (TRACON). The schedule shall include, at a minimum, the following for each flight:

- Takeoff time (all times local)
- Estimated land time
- FM Net and/or ATC call sign of PIC and/or observer
- Visual Observer name or initials
- Visual Observer cell phone number (back-up communication)

2.4.1 A NOTAM will be requested NLT 24 hours prior to UAS operations. KSGH Air Traffic Manager (or designated representative) will request a NOTAM via the Automated Flight Service Station (AFSS) at 1-800-487-6867. The following information, as a minimum, will need to be passed to the NOTAM representative:

- Date/time UAS activity will begin and end.
- A description of the operational area using radial and DME from KSGH navaid.
- The altitudes affected.
- Duration of the operation.
- Record the AFSS representative initials

2.6 FREQUENCY AUTHORIZATION AND DECONFLICITION: A list of frequencies that will be utilized will be provided to the KSGH Air Traffic Manager / Columbus TRACON for deconfliction and approval. Radio/communication checks with the KSGH Tower and Columbus TRACON will be pre-coordinated and approved by the facility before UAS operations begin. As a minimum:

- UAS DL Frequency: Verified & approved
- FM Net Frequency: Verified & approved
- PIC/VO Back up communication: (available cell phone #)
- Tower Back-up communication: (937) 525-5951

A list of system frequencies that will be utilized will be provided to the DOD Regional Air Frequency Coordinator (DSN 342-1194/1532, FAX DSN 342-1200) for deconfliction and approval.

ARTICLE 3.0 PROCEDURES

3.1 COMMUNICATION: The PIC, Observer, or designated team member will obtain FM net radios (primary communication method) from the KSGH Tower and conduct a radio check NLT one-hour

prior to launch to ensure the radio is operational; loud and clear. The same individual will verify that Columbus TRACON personnel have the UAS flight schedule for that day's UAS operations and that a NOTAM has been issued. Secondary communication procedures will be tested as well (normally cell phone) to insure operational; loud and clear.

3.2 UAS OPERATIONAL AREA: (See attached) The UAS fly area is defined as follows:

Center: 39-51-05.40N / 83-49-18.84W

East Boundary: 39-50-26.88N / 83-48-40.68W

South Boundary: 39-49-20.28N / 83-50-40.20W

West Boundary: 39-49-59.16N / 83-51-18.00W

North Boundary: 39-51-05.40N / 83-49-18.84W

Lost Link Orbit Point: 39-49-53.07N / 83-50-16.35W

3.3 PRE-FLIGHT BRIEFINGS: Prior to any sUAS operations, the operator will conduct a crew and safety briefing. The briefing will include, at a minimum, the following:

A. Mission overview.

B. Weather. (current and forecasted)

C. Flight route/area. Ensure operations area is briefed and understood.

D. Airspace surveillance procedures.

 1) Pilot's responsibilities.

 2) Observer's responsibilities.

 3) Pilot responsibilities in the event of ATC notification of observed aircraft in vicinity of UA operations not in two-way communication.

 4) Pilot/Observer responsibilities when they observe an aircraft in vicinity of UA operations.

E. Required items, mission equipment, verify appropriate FAA medical certificate (or military equivalent) and required personnel.

F. Crew actions, duties, and responsibilities. (Flight modes, radio calls, recovery team, etc.)

 1) Emergency actions.

 2) Mission considerations and actions to be performed by PIC/MO/VO.

G. General crew duties.

 1) *Pilot in Command (PIC)*

 a. Fly the air vehicle.

 b. Avoid traffic and obstacles.

 c. Cross check display symbology, messages, wind velocity/ direction.

 2) *Mission Operator (MO)* (if required by ONG Raven crews)

 a. Assist in traffic and obstacle avoidance.

 b. Manage radios.

 c. Navigate.

- d. Cross check display symbology, messages, wind velocity/direction
- e. Read and complete checklist items as required.
- f. Set/adjust pages/switches and systems as required.
- g. Note takeoff time.
- h. Log events
- i. Calculate and monitor times for holding and approaches. When on approach, watch for the air vehicle. Be prepared to direct the VO for a missed approach procedure, if required.
- j. When visual is acquired direct VO to the ground if needed.

3) Visual Observer (VO)

- a. Must remain within 1 nautical mile horizontally and 3000 feet vertically of the UAS during all operations.
 - b. Must keep the UAS in sight at all times.
 - c. Maintain two-way contact with the PIC/MO to warn of potential hazards.
 - d. Provide PIC/MO with instructions to steer clear of any potential collisions.
- H. Analysis of the aircraft; notate in logbook any preflight deficiencies.
- I. Risk assessment considerations.
- J. Comments: Instructor, Mission commander, Crew member, Observer questions, comments, and acknowledgment of the mission briefing.

3.4 PRE-FLIGHT PROCEDURES: sUAS are particularly sensitive to adverse weather conditions such as moderate blowing sand and dust, rain, severe turbulence, storms and lightening, and wind gusts. sUAS operators will be responsible to routinely check current and forecasted conditions. It will be the responsibility of the PIC to ensure weather conditions do not exceed system limitations as described in Operator's Manual. All flight operations will be conducted in Visual Meteorological Conditions (VMC) under Visual Flight Rules (VFR). The PIC will complete the Preflight checklist IAW the Operator's Manual.

3.5 LAUNCH & FLIGHT: The PIC will complete, at a minimum, the following:

- Follow procedures outlined in the Operator's Manual.
- If equipped with anti-collision lights - on from engine start to shutdown
- If equipped with position lights – on from launch to recovery
- If equipped with a transponder – on from launch to recovery
- Inform KSGH Tower that the sUAS is airborne.
- UAS shall remain within COA airspace.
- Operations will be conducted over a non-populated area.

3.6 POST FLIGHT PROCEDURES: The PIC will complete, at a minimum, the following:

- Notify KSGH Tower upon completion of each sortie.
- Inventory and account for all equipment
- Report any discrepancies

- Conduct a visual and functional equipment inspection
- Complete an entry to the flight log
- Last flight of day: notify KSGH Tower and Columbus TRACON upon completion of daily activities.

3.7 EMERGENCY PROCEDURES: Preventing a mishap or sUAS loss or damage depends on early recognition of dangerous flight conditions or malfunctions followed by appropriate corrective action. Both the Pilot in Command and Visual Observer will memorize the immediate action items of each emergency procedure outlined in the Operator's Manual. Mission planning must include alternative courses of action available for each phase of the proposed flight. To the extent possible, planned courses of actions for emergencies should be made before the flight begins to include ensuring the waypoints used for loss-of-link scenarios ("Rally" waypoint for ONG Raven operations which is the Ground Control Station location in the event of loss-of-link) and waypoint for routine landings are within the designated COA airspace. During flight, both operators must maintain situational awareness and PIC should always know which direction to fly to escape a potential hazard. VO should always know UA position relative to hazards and be ready to give PIC headings and altitudes to fly to safety. Those steps that must be performed immediately in an emergency are underlined and/or in bold print in the Operator's Manual. The operators must be able to perform these steps without referencing the checklist or manual. Non-underlined/bold print steps can be accomplished with use of the checklist. During an emergency, the PIC will complete, at a minimum, the following:

- Follow procedures outlined in Operator's Manual.
- Immediately notify KSGH Tower and advise them of the nature of the emergency situation and/or any other pertinent information. KSGH Tower will then inform Columbus TRACON.
- If there is a fly-away emergency, KSGH tower will contact Columbus TRACON and advise last known position, direction of flight, estimated flight time remaining (based on remaining battery life or fuel load) and last known altitude. Assist Columbus TRACON as much as possible.

3.8 LOST LINK PROCEDURES: The UA will be programmed "go-to rally" and autoland. The "rally" point will be located over the Ground Control Station (GCS) within approved COA airspace. A secondary option is available to the UA operator to program the UA to "End Flight" upon lost-link which will cause the immediate termination of the flight. All lost link procedure must be contained within the approved COA airspace and remain below 1000' AGL.

3.9 LOST COMMUNICATIONS: In the event that two-way communications are lost or become unavailable, the operator will execute "go-to rally" and autoland or "end flight" within the approved COA airspace, below 1000' AGL.

3.10 MISCELLANEOUS:

A. The Ohio National Guard and/or its representatives are responsible at all times for collision avoidance with non-participating aircraft and the safety of persons or property on the surface with respect to the UAS.

B. Incident / Accident Reporting: The following information is required to document unusual occurrences associated with UAS activities in the National Air Space System.

1) The proponent for the COA shall provide the following information to Donald.E.Grampp@faa.gov on a monthly/annual basis (Note: reporting is not required until the first flight occurs. Then reporting must continue on a monthly/annual basis even when no flights are executed):

- Number of flights conducted under this COA.
- Pilot duty time per flight.
- Unusual equipment malfunctions (hardware/software).
- Deviations from ATC instructions.
- Operational/coordination issues.
- All periods of Loss of Communications.
- All spill outs from COA airspace.

2) The following shall be submitted via COA online, email or phone (202-385-4542, cell 443-569-1732) to Donald.E.Grampp@faa.gov within 24 hours and prior to any additional flight under this COA:

- Deviations from the "Special Provisions" contained in the COA.
- All periods of Lost Link, including duration.
- All incidents involving the UAS as defined in 49 CFR 830.
- All accidents involving the UAS as defined in 49 CFR 830.

ARTICLE 4.0 TERMS OF AGREEMENT

The term of this MOA is for a period of 24 months, commencing on the date of the last signature affixed below. Either party may terminate this MOA upon delivery of written notice at least 30 days in advance. Modifications will be made by mutual party written agreement only. If either party desires a modification of this agreement, the parties shall, upon reasonable notice of the proposed modification by the party desiring the change, confer in good faith to determine the feasibility of such modifications. Modifications shall not be effective until duly authorized representatives of the parties sign a written agreement. This MOA will be reviewed annually in writing by each party's designated organizational MOA point of contact.

ARTICLE 5.0 SIGNATURES



STUART K. DRIESBACH

COLONEL, OHARNG

STATE AVIATION OFFICER

Date: 23 Dec 11



JAMES A. BODENMILLER

CITY MANAGER

Date: 12/21/2011

APPROVED AS TO FORM
AND CORRECTNESS



Deputy Law Director

GLOSSARY / DEFINITIONS

ATM: Air Traffic Manager

COA: Certificate of Authorization

KSGH: Springfield-Beckley Municipal Airport

MO: Mission Operator – an additional member utilized by the US Army Raven crews

MOA: Memorandum of Agreement

NOTAM: Notice to Airmen

ONG: Ohio National Guard

PIC: Pilot in Command – Operator of the UA (also known as the vehicle operator by ONG)

Rally: A pre-programmed waypoint used by Raven UAS

Raven: UA type operated by ONG

SAO: State Aviation Office which oversees Army National Guard aviation programs

SOP: Standard Operating Procedure

TAG: The Adjutant General, Commander of the Ohio National Guard appointed by the Governor

TRACON: Terminal Radar Approach Control

UA: Unmanned Aircraft

UAS: Unmanned Aerial System - prefix "s" references "small"

VFR: Visual Flight Rules as defined by FAA

VMC: Visual Meteorological Conditions

VO: Visual Observer